Westerness, Port Appin, 1885, *C. Bailey*; Dumbarton, Kilpatrick Hills, 1889, *L. Watt*, comm. *A. Bennett*; Kerry S., Caragh Lake, 1889, *R. W. Scully*.

var. *crassa*. — Westmoreland, Grasmere, 1884, *T. A. Cotton*, comm. *A. Bennett*.

N. OPACA *Ag.*— Kent W., 1888, *J. G.*; Renfrew, 1887, *R. Kidston*; Selkirk, 1876, *A. Craig Christie, herb. Boswell*; Haddington, 1861, *J. T. Boswell, herb. Boswell*; Kincardine, 1860, *J. B. Syme, herb. Boswell*.

EXPLANATION OF PLATE 296. —A, *Nitella Nordstedtiana*, nobis; plant natural size, from specimen in Dr. Ward's herbarium. B, Branch, from specimen sent to us fresh by Mr. A. Bennett. C, Ditto, × 19. D, End-segments of fertile branchlets, × 150. E, Fruiting branchlet, × 32. F, Fruit, × 60. G, Oospore, × 60. H, Part of surface of oospore, × 375 (after photo. by J. Guardia). I, Forking, with antheridium and young fruit, × 60. K, *N. tenuissima*, Kuetz.; end-segments of fertile branchlets, × 150. L, Ditto, oospore, × 60. M, Ditto, part of surface of oospore, × 375 (after photo. by J. Guardia).

A MONOGRAPH OF THE GENUS *PODAXIS* DESV. (= *PODAXON* FR.).

BY GEORGE MASSEE.

(Concluded from p. 39.)

AFFINITIES.

From what has already been said, it will be seen that we are dealing with a genus showing considerable latitude in the mode of spore-formation, in the most typical species the spores are produced as asci of peculiar form and mode of arrangement, and in searching for homologous structures we find the nearest approach in the subterranean fungi constituting the *Hypogæi*, which are divided into three groups, the *Hymenogastreæ*, or basidiosporous division; the *Tuberaceæ*, characterized by having the spores produced in asci; and the *Elaphomycetæ*, also ascigerous, but so evidently distinct in many important points from the *Tuberaceæ* that Tulasne considered the division of ordinal value, and expressed his views as to its relative position as follows:—"Elaphomycetes Tuberaceis genuinis quoad fructificationem analogi, structura morphosisque floccoso-pulveracea sicca ab eis toto coelo differunt et ad Lycoperdeos basidiosporos accedunt, qua propter fungus utriusque familiæ medii connectere videntur."*

The *Elaphomycetæ*, as already stated, are truly ascigerous, by which I mean that one or more spores produced by free cell-formation appear in a mother-cell, from which they eventually escape, the wall of the mother-cell forming no part of the walls of the daughter-cells, but remaining usually for some time in a

* 'Fungi Hypogæi,' p. 101.

shrivelled condition after the escape of the daughter-cells, and known as an ascus; hence the resemblance presented by the *Elaphomycetæ* to the *Lycoperdineæ*, as stated by Tulasne, depends on the spores forming a pulverulent mass when mature, and on the presence of a capillitium, imperfect at first, as would naturally be expected, nevertheless the precursor of a contrivance which, in its perfected form, as seen in the majority of *Gastromycetes* that become elevated into the air when mature, proved of service in spore-dissemination, so long as this was effected by physical means, but which we find to be eventually superseded in the *Phalloideæ*, where, by a gradual modification of certain portions of hyphæ along other lines, we find a series of contrivances in the form of scent, colour, and sugar respectively produced for the purpose of favouring the visits of insects, and thus securing spore-dissemination after the fashion of seed-dispersion in certain groups of phanerogams. I have shown elsewhere* the gradual conversion of the ascigerous *Tuberaceæ* into the basidiosporous *Hymenogastreæ*, due to the changes of asci into basidia, and the subsequent evolution of the whole of the above-ground *Gastromycetes* from the subterranean ascigerous *Tuberaceæ* through the *Hymenogastreæ;* and now we find a second attempt on the part of the *Tuberaceæ* to evolve an above-ground branch through the *Elaphomycetæ*, and continued by the genera *Podaxis*, *Tulostoma*, and possibly *Batarrea* and *Queletia*.

The asci in the *Elaphomycetæ* appear to be in a very unstable state; in *Elaphomyces granulatus* Vitt. we find asci of the same shape, and arranged in clusters exactly as in *Podaxis* (fig. 15); and in one and the same portion under the microscope, asci containing one, two, three, and four spores respectively can usually be seen, the asci varying in form and size depending on the number of contained spores (figs. 16–18); in the remaining species of *Elaphomyceæ* the asci, as regards arrangement and variability, agree with *E. granulatus*. In all the species of *Elaphomyces* the commonest number of spores in an ascus is four, but a single spore is by no means uncommon; and the capillitium, although consisting of thick-walled and obviously differentiated hyphæ, is devoid of any arrangement in the way of spiral corrugations for promoting elasticity, which would be useless in a subterranean fungus; but in *Podaxis*, where, due to the excessive development of the homologue of the sterile basal portion in many of the *Hppogæi*, the peridium is elevated above ground, we find an improvement in the portion specially told off for promoting spore-dissemination, the capillitium; and contemporaneous with this modification we find the ascigerous mode of spore-formation being replaced by the basidiosporous method.

Now this is the sequence presented in the evolution of the *Gastromycetes* before mentioned; why should it be necessary, when the subterranean *Tuberaceæ* evolve above-ground sections, that the original ascigerous condition should be replaced by a basidiosporous

* 'A Monograph of the British Gastromycetes,' Ann. Bot. vol. iv. pp. 1—101, 4 plates.

stage? It is certain that the entire group of the *Gastromycetes* have sprung from the *Tuberaceæ*, and it is equally evident that the efforts to change an entirely subterranean condition for an above-ground one at maturity is closely connected, if not entirely concerned, with securing a more perfect method of spore-dissemination; remembering that the structure of the primitive stock—the *Tuberaceæ*—consists of a hymenial portion producing spores in asci entirely surrounded by a stout wall, spore-dispersion depending on general decay, or in some instances the entire fungus is eaten by animals, and the spores consequently removed; nevertheless it is obvious that such a structure must undergo a considerable amount of modification on emerging above ground before the desired freedom and facility in spore-diffusion is attained.

We have evidence of four distinct attempts to effect this object by the subterranean prototypes of the modern above-ground *Gastromycetes*, and if we estimate the success of each attempt by the numbers and distribution in space of its respective members, we find that three out of the four have proved failures, the successful idea being that which evolves from the conversion of asci into basidia, combined with a copious, more or less elastic capillitium, this being the structure of all the above-ground *Gastromycetes*, and the one from which, as already explained, the yet more perfect spore-diffusion through insect-agency evolved.

Of the three unsuccessful attempts to adapt the subterranean structure to aërial requirements may be mentioned:—(1) The total suppression of the outer thick protecting wall or peridium, leaving nothing but the hymenial portion, part of which was necessarily exposed, as in *Gautiera;* this scheme, so far as is known, only extended to one genus, containing two species. (2) The outer peridium pierced by a terminal aperture, thus following the idea characteristic of the *Sphæriaceæ*, kept up by one genus, *Pachyphlœus*, containing but few species. (3) The conversion of that portion of the ascogenous hypha that immediately produces the asci into a basidium, and the development of an abundant, more or less elastic capillitium, as illustrated by the group evolving from *Podaxis* as a connecting-link with the primitive ascigerous stock, and including the genus *Tulostoma*, and in all probability *Battarrea* and *Queletia*. The two first-named genera each contain a considerable number of species, and, as already stated, although comparatively rare, have a wide geographical range, suggestive of antiquity; and possibly the present known species may be looked upon as the survivors of a once more numerous group, illustrative of the earliest attempt on the part of the altogether subterranean *Tuberaceæ* to improve their condition and extend their range, by placing themselves under more favourable surroundings at the period of spore-dissemination.

It is interesting to note that, however far removed the members of the *Gastromycetes* have become from the parent subterranean stock in the matter of spore-diffusion, yet in almost every instance the whole of the differentiation of the gleba up to the period of spore-formation takes place before the fungus is elevated above ground, and without a clear explanation of the sequence of develop-

ment of the very varied and complicated structures presented by the different sections, it is difficult to realize that the only known idea embodied is, as already stated, a determination on the part of every generic assemblage to outvie its neighbours in providing the most perfect arrangement for securing the world-wide distribution of its own kind.

Accepting the genera *Podaxis* and *Tulostoma* as at present defined, we find the gradual transition from the ascosporous to the basidiosporous type effected as follows. In *Podaxis* it has been shown that the asci generally originate in a crowded manner from special, short, variously-branched, closely-septate hyphæ, but in most species we find along with this typical method certain ascogenous hyphæ sparingly or not at all branched, and with fewer septa; now in *P. Emerici* the last-mentioned exceptional form of ascogenous hyphæ is found to be typical; furthermore, the exceptional mode of spore-formation in most species, where the ascus remains as an outer coat to the spore, is also the rule in *P. Emerici*.

The peculiar nature of the basidia in the genus *Tulostoma* was first described by Schröter,* who shows that in *T. mammosum* these structures originate as short lateral branches from the hyphæ of the spongy gleba. These short lateral branches, after receiving the protoplasm from the parent hypha, are cut off from the latter by a septum near the base; the terminal portion increases in diameter, but remains more or less cylindrical, and is now a basidium, as proved by the appearance of four lateral papillæ, which continue to increase in size, absorb all the protoplasm from the basidium, become cut off from the latter by a septum at the neck, and finally drop off as spores. Schröter has given five figures of the basidia,† each bearing four spores showing the scattered and generally lateral mode of origin; in one example there is a terminal spore, but there is evidently no stereotyped definite position as shown in typical basidiomycetes.

In a young specimen of *Tulostoma pusillum* Berk. I find the same thick, cylindrical, aseptate basidia bearing from six to eight lateral spores, and in Corda's figure of *Tulostoma fimbriatum* the spores are represented as originating in elongated clusters, suggesting the idea of a lengthened basidium covered with numerous spores; this I have had no opportunity of corroborating, nevertheless we see that in the species of *Tulostoma* the basidia originate as lateral branches, and produce lateral spores, irregularly arranged, and variable in number, thus presenting many points in common with the homologous parts in *Podaxis*, in fact only differing in the total absence of septa in the basidium, and in the wall of the basidium becoming the wall of the spore.

Podaxis Emerici is the existing connecting-link between the extremes of structure met with in *Podaxis* and *Tulostoma* respectively. In an immature specimen of *Batarrea Steveni* I have succeeded in ascertaining that the asci are clavate, and at the apex of the basidia

* Entw. u. Tulostoma, in Cohn's Beitr. ii. p. 65.

† *Tom. cit.* p. 68 (woodcut).

are indications of scars, but the material at command was too imperfect to ascertain the number or mode of attachment of the spores; the capillitium-threads have the spiral thickening inside more distinctly differentiated than in those of *Podaxis*, and sometimes passing into the annular form. That the above remarks were to some extent anticipated by De Bary is shown by the following quotation:—"The differences between the genera *Batarrea* and *Podaxon* and the typical *Lycoperdaceæ* which have been hitherto under consideration, are sufficiently striking to require a special description."*

Geographical Distribution.

The species of *Podaxis*, seven in number, are not abundant anywhere, and being very conspicuous and readily preserved, it is not to be expected that many novelties remain to be discovered, or the range of known species extended to any marked extent. As already remarked, there is a primitive quaintness in the general morphology, which, added to the fact that the known species are confined to geologically old-fashioned places, suggests that we are dealing with the fragmentary remains of a first attempt to emerge from the altogether subterranean habits of the pioneers of our modern group of *Gastromycetes*.

The genus ranges from St. Domingo, California, 116° W. long., to Brisbane, 153° E. long., and from New Mexico, 35° N. lat., to Melbourne, 37° S. lat. All the species are met with in arid, sandy districts. *P. indica* often occurs in numbers on the large hillocks made by ants at the Cape of Good Hope and in Afghanistan; in both places it is eaten by the natives. Africa may perhaps be looked upon as the geographical centre of the genus at the present day. Species have been collected in the Egyptian desert on the east, the Cape de Verde Islands, and from Senegambia, following the west coast to S. Africa, where individuals appear to be far more numerous than in any other known district. The Island of Socotra, where *P. indica* has been collected, forms the stepping-stone to Asia, where two species extend to the Himalayas and Afghanistan, and, by way of a surprise, undoubted *P. indica* occurs in Queensland and Victoria. Finally, a single species, closely allied to, but quite distinct from the Old World species, occurs within a limited area on the Western side of North America. So far as is known, the genus is not represented in Europe or South America.

Classification.

Podaxis Desv. — Peridium at first subterranean, sessile, concealing the gleba, which is traversed by a central axis; substance of gleba spongy, without distinct cavities or tramal-plates; asci monosporous, produced in dense clusters; capillitium copious or obsolete. The peridium after spore-formation is elevated above ground on a long stem, and at maturity dehisces by becoming irregularly torn, and separating from the stem at its basal point of attachment.

* 'Fungi, Mycetozoa, and Bacteria,' Engl. ed., p. 317.

Podaxis Desvaux,* Journ. Bot. tom. ii. p. 97 (1809); Fries, Syst. Orb. Veg. pars. i. Plant. Homon. p. 159 (1825). Fries says: "Genus mihi ignotum, *Cauloglosso* forsan analogon." *Podaxon* Fries, Syst. Myc. iii. p. 62 (1829); this is the first time the word *Podaxon* was used, and Fries explains its appearance as follows:— "Nomen πους et αξων derivatum, *Podaxon* scribendum est." Corda, Icon. Fung. v. p. 24 (1842); Sacc. Syll. Fung. vol. vii. pars. i. p. 58 (1888). *Lycoperdon* Bosc. Act. Soc. Hist. Nat. de Paris, tom. i. pars i. p. 47 (1792); Linn. Mant. Pl. p. 313 (1767); Linn. Suppl. Pl. p. 453 (1781). *Scleroderma* Pers. Syn. Meth. Fung. p. 150 (1801). *Mitremyces* Sprengel, Syst. Veg. p. 518 (1827). *Cionium* Spreng. Syst. Veg. p. 529 (1827). *Schweinitzia* Grev. Edin. Phil. Journ. vol. viii. p. 257 (1823).

Desvaux was undoubtedly the first to notice that the species called *Lycoperdon axatum* by Bosc was generically distinct from *Lycoperdon* and *Scleroderma*, consequently his name of *Podaxis* has been restored, the reason given above by Fries for substituting *Podaxon* not being valid; other things being equal, grammatical accuracy is most desirable, but, considering that a generic name is only of symbolic value, it is best to adhere to the original symbol, thereby avoiding the inevitable complication following any tampering with the original name.

All the species appear to be white when young, the peridium and stem passing at maturity to a dingy ochre, varying more or less in intensity, but of no specific value; neither is the great variability in texture of the peridium, which varies from polished to fibrillose or squamose in the same species; whereas the colour of the spores when mature appears to be constant. The colour of spores described as seen in the mass is as it appears to the naked eye, whereas the colour of individual spores is as seen under the microscope by transmitted light.

A. *Capillitium abundant, threads coloured.*

1. Podaxis indica (Spreng.).— Peridium elliptical, even, rather polished; basal margin irregularly lacerated after dehiscence; stem elongated, attenuated upwards, hollow, more or less incrassated at the base; mass of capillitium and spores dark reddish brown; capillitium very dense, threads simple or rarely branching at wide angles, bright brown, very much curled and intertwined, 9–11 μ thick, spiral marking distinct, often splitting into a flat, spirally-coiled ribbon; spores bright brown, irregularly globose or broadly elliptical, 10–12 or 10–12 × 9–10 μ, smooth.

Mitremyces indicus Spreng. Syst. Veg. v. 5, p. 518. *Scleroderma pistillare* Pers. Syn. Meth. Fung. p. 150. *Lycoperdon pistillare* Linn. Mant. Pl. p. 313. *Schweinitzia pistillaris* Grev. in Edin. Phil. Journ. vol. viii. p. 257, pl. vi. (in the text the spelling of the generic name given in honour of Schweinitz, the mycologist, is correct, but on the plate it is "Schweinizia," and this mistake is copied by Fries, S. M. iii. pp. 62–63). *Podaxon pistillaris* Fries,

* 'Observations sur quelques genres à etablir dans la famille des Champignons.'

Syst. Myc. iii. p. 63; Sacc. Syll. vol. vii. pt. i. No. 171. *Podaxon arabicus* Pat. Bull. Soc. Myc. vol. iii. p. 122, pl. xi. f. 1 (1887).

Peridium 7–10 cm. high by 3–4 cm. broad; stem 10–17 cm. long, and about 1 cm. thick below; the bulb-like base of the stem is mostly due to sand being firmly agglutinated together by the mycelium.

Hab. In dry sandy places, or on the nests of termites. Edible. South Africa (*Prof. MacOwan*); Porto Praya, Cape de Verde Is. (*Sir J. D. Hooker*); Niger Exp. (*Barter*); Socotra (*Prof. I. B. Balfour*); Madras; Rawul Pindee, Punjab; Himalayas; Afghanistan (*Dr. Aitchison*); Victoria and Queensland, Australia.

2. Podaxis carcinomalis (Linn.). — Peridium oblong-ovate or broadly elliptical, smooth, then often more or less fibrillose, lower free margin irregularly torn; stem elongated, very much attenuated upwards, hollow, base swollen and often oblique; mass of capillitium and spores dark umber-brown; capillitium dense, threads thick-walled, bright brown, simple or rarely branched, very much twisted and interlaced, spiral marking distinct, often breaking up into a flat, spiral ribbon, 10–12 μ thick; spores bright brown, smooth, elliptic-oblong, 10–12 × 6–7 μ.

Lycoperdon carcinomalis Linn. Suppl. Pl. p. 453. *Podaxon carcinomalis* Fries, Syst. Myc. iii. p. 62; Sacc. Syll. No. 168; Fischer, Hedw. 1889, Heft i. p. 1, t. 1, figs. 1–2. *Podaxon elatus* Welw. & Curr. Trans. Linn. Journ. vol. xxvi. p. 288, pl. 19, f. 4–6. *Scleroderma carcinomale* Pers. Syn. Meth. Fung. p. 151.

The type-specimen of Linnæus is in the Linnean Herbarium, now in the possession of the Linnean Society, and the type of Welwitsch & Currey is in the Kew Herbarium.

The peridium varies from 7–20 cm. in height by 5–12 cm. in breadth; the stem is also variable in proportion, 12–40 cm. long by 1–3 cm. thick towards the base.

The present species is most closely allied to *P. indica*, but is altogether a larger and more robust plant, and well characterized by the spores and the stouter stem with the usually oblique swollen base.

Hab. Sandy places, and on nests of white ants. Niger Exped. (*Barter*); Uitenhage (*Zeyher*); South Africa; S.W. Africa (*Dr. Schinz*); Angola (*Dr. Welwitsch*).

Var. *minor* Berk. in herb.—Very much smaller and more slender than the typical form, but capillitium and spores exactly the same.

Hab. On the ground. Entire plant 6–7 cm. high. Natal.

B. *Capillitium very scanty or obsolete.*

3. Podaxis axata (Bosc.). — Peridium elliptical, smooth or fibrillose, usually torn into irregular, pointed segments at the lower, free margin; stem elongated, attenuated upwards, fibrillose and usually twisted, hollow, base bulbous; mass of spores olivaceous-umber; capillitium rare or altogether obsolete; spores variable in form, broadly elliptical or irregularly subglobose, dusky olive with a brown tinge, wall thin, 13–14 or 13–14 × 10–11 μ.

Lycoperdon axatum Bosc. Actes de la Soc. d'Hist. Nat. de Paris, tom. i. pars i. p. 47, plate xi. (but called pl. vi. in the text), (1792). *Podaxis senegalensis* Desv. Journ. Bot. tom. ii. p. 97. *Cionium senegalense* Spreng. Syst. Veg. p. 529. *Podaxon calyptratus* Fries, Syst. Myc. iii. p. 63; Sacc. Syll. No. 170. *Podaxon Loandensis* Welw. Apont. Fl. Angol. p. 535; Welw. & Curr. Trans. Linn. Soc. v. 26, p. 288, tab. 20, f. 5, 6, 7.

There is an authentic specimen of *P. Loandensis* from Dr. Welwitsch in Herb. Berk., Kew, No. 4532.

Peridium 6–8 cm. high; stem 10–17 cm. long, coarsely fibrous, the fibres in a diffuse spiral owing to the twisting of the stem, base very much incrassated; spores always with an olive tinge.

Hab. Dry sandy places. Edible. Senegal; Angola (*Dr. Welwitsch*); Ugui, E. Africa (*Mus. Brit.*); Ceylon (*Gardiner*); Niger Exped. (*Barter*).

4. Podaxis Mossamadensis (Welw. & Curr.).—Peridium elliptical or conical when expanded, often irregularly longitudinally rugose, lower margin irregularly torn; stem elongated, subequal or slightly attenuated upwards, stuffed, base bulbous; mass of capillitium and spores blackish brown; capillitium very scanty, threads without spiral markings, 8–9 μ thick; spores subglobose, deep brown, 8–9 μ diameter.

Podaxon Mossamadensis Welw. & Curr. Trans. Linn. Soc. v. xxvi. p. 288, t. 17, f. 3 (spores), & t. 19, f. 1, 2, 3.

Type in Herb. Mus. Brit.

Peridium 7–12 × 4–7 cm., stem 15–27 cm. high, 1–2 cm. thick; the stem is sometimes swollen just within the point of attachment of the base of the sporangium. The minute apiculus on the spore mentioned in the original description is caused by a thickening of the epispore immediately over the germ-pore; a similar projection is present in every species, but is more pronounced in the present. Characterized by the stout, subequal, stuffed stem with a bulbous base, and the small globose spores.

Hab. Sandy places. Mossamedes, Angola (*Dr. Welwitsch*); Madeira (*Lowe*).

5. Podaxis Ægyptica (Mont.).—Peridium narrowly elliptical or oblong; stem subequal, fibrous, more or less twisted, base incrassated; mass of spores rusty-brown; capillitium very scanty; spores broadly elliptical, dark reddish brown, 11–12 × 9 μ.

Podaxon Ægypticus Mont. Syll. Cr. No. 1044; Corda, Icon. Fung. vi. p. 18, t. 3, f. 44; Fischer, Hedw. Heft. i. (1889), pl. i. figs. 3, 4, 5. *Cauloglossum Ægypticum* Sacc. Syll. No. 167.

Type in Herb. Mus. Par.

The smallest species known; peridium 4–5 × 2 cm., stem 6–7 cm. long.

Hab. Sandy places. Desert of Gaza, near Suez; S.W. Africa (*Dr. Schinz*).

6. **Podaxis Farlowii** Mass., n. sp.—Peridium obovate-oblong, apex very obtuse, free basal margin irregularly lacerated; stem elongated, subequal, often twisted, stuffed, only slightly or not at

all swollen at the base; mass of spores blackish brown; capillitium-threads very rare, with indistinct spiral markings; spores irregularly globose or broadly elliptical, smooth, clear dark brown, 10–12 or 10 × 12 μ.

The present species is characterised by the peridium being very obtuse and broadest at the apex, the stuffed, subequal stem, and subglobose, brown spores. Peridium 6–8 × 3–4 cm., stem 14–18 cm. long.

"Arizona, *Dr. Palmer*, *Herb. W. G. Farlow*" specimen sent to Berkeley, now at Kew, and accepted as type of the present species. New Mexico (*Gerard*, No. 287); Rio Grande, N. Mexico (*Wright*).

7. Podaxis Emerici (Berk.).—Peridium elliptic-oblong, covered with dark-coloured, squarrose, fibrillose scales; stem elongated, attenuated upwards, hollow; mass of spores olive-brown; spores broadly elliptical, smooth, with a distinct apiculate hilum, olive with a tinge of brown, 20–22 × 12–14 μ; capillitium obsolete.

Podaxon Emerici Berk. in herb. — Peridium 6–8 × 4 cm., stem 14–16 cm. long. Characterized by the scaly peridium and the large olive spores.

Musalapatam, Himalayas (*Capt. Emeric Berkeley*).

Description of the Figures on Plates 294 and 295.

Plate 294.—Fig. 1, *Podaxis indica*, vertical median section of a young specimen before differentiation of the gleba; nat. size. 2, *P. indica*, vertical median section of young specimen after differentiation of the gleba, *a;* central axis, *b;* peridium, *c;* basal portion that eventually elongates and forms the stem, *d;* nat. size. 3, *P. indica*, portion of an ascogenous branch; × 1200. 4, *P. indica*, portion of an ascogenous branch with empty, shrivelled asci; × 1200. 5, *P. indica*, an ascus containing two immature spores; × 1200. 6, *P. indica*, portion of a capillitium-thread showing the spiral marking, and at one end broken up into a flat, spirally-coiled ribbon; × 1200. 7, *P. indica*, diagrammatic section of a capillitium-thread showing the ridges on the inner surface of the wall arranged spirally. 8, *P. indica*, hyphæ from young specimen; × 1200. 9, *P. indica*, spore in optical section, showing the germ-pore; × 1200. 10, *Podaxis carcinomalis*, a small ascogenous tuft; × 1200. 11, Diagrammatic median vertical section of an ascogenous branch of *Podaxis Emerici*, showing the incrassated branch with but few septa; if this is compared with the basidia of *Tulostoma*, fig. 12, it will be seen that the only morphological distinction between the two consists in the absence of septa in the latter. 12, *Tulostoma pusillum*, basidia with spores; × 400. 13 & 14, spores of above in different stages of development; × 1200. 15, *Elaphomyces variegatus*, portion of an ascogenous hypha with asci in various stages of development; × 400. 16, 17, 18, asci of same containing one, two, and four spores respectively; × 400.

Plate 295.—Fig. 19, *Podaxis Farlowii*, entire fungus; nat. size. 20, spores of same; × 350. 21, spore of same; × 1200. 22, *Podaxis Emerici*, entire fungus; nat. size. 23, vertical median section of same; nat. size. 24, spores of same; × 350. 25, spore of same, showing hilum, *a;* and germ-pore, *b;* × 1200. 26, spore of same, showing outer membrane of spore split and partly removed; × 1200.